into combination with the respired oxygen, forming carbonic acid and water, do not generate sufficient heat for the purposes of animal life; and that consequently there must be some other sources of heat in the animal economy, one of which he believes to be the secretion of carbon.

"Electro-Physiological Researches.—Fourth Memoir. On the Physiological Action of the Electric Current." By Charles Matteucci. Communicated by Michael Faraday, Esq., LL.D., F.R.S.

In the prosecution of his inquiries on the physiological action of electric currents, the author found it necessary to employ an apparatus, which was expressly made for him by M. Bréguet, adapted to the delicate appreciation of the intensity of the force of the muscular contractions excited by those currents; of which apparatus he gives a minute description, illustrated by a drawing. He was thus enabled to institute an exact comparison between the contractions caused by the direct, and those by the reverse currents, both at the commencement and at the termination of their action. The following are the general conclusions he deduces from the experiments thus conducted.

1. The passage of the electric current through a mixed nerve produces a variation in the excitability of the nerve, differing essentially in degree, according to the direction of the current through the nerve. This excitability is weakened and ultimately destroyed; and this takes place more or less rapidly according as the *direct current*, that is, a current circulating through the nerve from the centre to the periphery, is more or less intense. On the other hand, by the passage of the same current in the contrary direction, that is, from the periphery to the centre, or the *inverse current*, the excitability is preserved and increased.

2. The variations in the excitability of the nerve produced by the passage of the current, tend to disappear more or less rapidly on the current ceasing. If the nerve be taken from a living animal, or from one in which life is but just extinct, so that its excitability is very great, these variations last only as long as the current continues to circulate; while, if the nerve has already lost some of its excitability, they survive the cessation of the current by a period of from one to ten or fifteen seconds.

3. If the same current be made to act upon a mixed nerve, the contraction which occurs on the first moment of its introduction is very different according to its direction; the direct current always occasioning a stronger contraction than that produced by the inverse current.

"On Phlogiston and the Decomposition of Water." By W. F. Stevenson, Esq., F.R.S.

The author is of opinion that the evidence on which the modern theory of the composition of water is founded, is fallacious; and believing water to be a simple body, he conceives that it forms hydrogen by combining with the electric fluid, which he imagines

to be identical with the phlogiston of former chemists. He cites the opinions of Priestley, Cavendish and Watt, as corroborating his views, and interprets their experiments in conformity with the hypothesis he has adopted.

"Suggestion intended to confirm Franklin's Theory of Electrostatics, by explaining the phenomena of Repulsion between bodies negatively electric." By James A. Smith, Esq. Communicated by S. Hunter Christie, Esq., Sec. R.S., &c.

The author conceives that in negatively electrified bodies, or bodies having less than their natural quantity of electricity, the redundant matter must have a tendency to escape, and thus the equilibrium of its cohesion is destroyed; and that two bodies in such a condition must mutually repel each other.

"On Sir Isaac Newton's Method of finding the Limits of the Roots of Equations." By Herbert Panmure Ribton, Esq. Communicated by John George Children, Esq., F.R.S.

The author states that he has reason to believe that by generalizing from successive inductions of equations, a formula more universal than Newton's Binomial could be found.

"Description of a Method of Registering Magnetic Variations." By Charles Brooke, Esq., M.B. Communicated by G. B. Airy, Esq., F.R.S.

A vertical stream of light issuing through a slit in the copper tube of a camphine lamp, is reflected by a concave mirror fixed vertically on the axis of a suspended magnet, and condensed into a focus by a cylindrical lens placed at the distance of about seven feet from the mirror. The luminous image, which shifts its position according to the movements of the magnet, but to a much greater extent, impinges on highly sensitive photographic paper, wound round a horizontal cylinder, which is made, by a watch movement, to revolve once in twelve hours. Thus, by a combination of the vertical movement of the paper with the horizontal movement of the image, the magnetic curve of variation is distinctly portrayed and registered.